UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/693,070	10/24/2003	Abhijeet P. Gole	5693P028	3377

48102	7590	08/22/2006

NETWORK APPLIANCE/BLAKELY
12400 WILSHIRE BLVD
SEVENTH FLOOR
LOS ANGELES, CA 90025-1030

EXAMINER
KO, DANIEL BOKMIN

ART UNIT	PAPER NUMBER
2189	

DATE MAILED: 08/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/693,070	GOLE ET AL.
	Examiner	Art Unit	
	Daniel B. Ko	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _5/19/2006_.

2a)☒ This action is **FINAL.**   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-16 and 18-23_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-16 and 18-23_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _7/17/2006_.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

DETAILED ACTION

This action is responsive to the application filed on 10/24/2003. Any objections

and rejections from the prior correspondence not restated in this communication is/are

withdrawn.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 7/17/2006 was

considered by the examiner.

Drawings

The substitute drawing of Fig. 9 filed 5/19/2006 has been entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.

   4.   Considering objective evidence present in the application indicating
         obviousness or nonobviousness.

1.   Claims 1, 2, 7-11, 16, 18, 21, and 22 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Yanai et al. (US Patent 6,505,205 B1), hereinafter simply

Yanai, in view of Tremblay et al. (US Patent 6,728,898, B2), hereinafter simply

Tremblay.

      Regarding claims 1-2, 16 and 21-22, Yanai teaches a method of mirroring data

stored in a source storage system, the method comprising:

      receiving at the source storage system a plurality of requests from a set of clients, the

requests indicating modifications to be made to stored data (Fig. 1, Primary Data Storage

System 14; column 7, lines 48-57);

      saving modified data in the source storage system based on the requests (column 7,

lines 51-58);

      receiving the modified data at a destination storage system from the storage system,

wherein the destination storage system is configured to receive the modified data from the

source storage system and not from any client of the set of clients (column 8, lines 51-67;

column 9, lines 26-36).

      Yanai does not teach a mirroring at least a portion of the modified data in the

destination storage system without requiring said portion of the modified data to be sent

from the source storage system to the destination storage system during the

synchronization phase. Tremblay teaches the limitation, mirroring at least a portion of

the modified data in the destination storage system without requiring said portion of the modified data to be sent from the source storage system to the destination storage system during the synchronization phase (column 1, lines 59-67; Tremblay discloses the write requests received at the second storage processed prior to commit-synchronization with first storage device which could results in synchronization without transfer of modified data from the first storage). At the time of invention it would have been obvious to a person of ordinary skill in the art to combine the Yanai with Tremblay. The motivation for doing so would be a confirming data associated with all write requests that preceded the designated write request have been written to the second storage device (column 1, lines 46-67).

Regarding claims 7 and 11, Yanai teaches a method, wherein said portion of modified data consists of blocks wholly modified as a result of the requests (column 38, lines 63-67; column 39, lines 1-19).

Regarding claims 8 and 10, Yanai teaches a method, further comprising:

creating a log entry in the source storage system for each of the write requests; and transmitting each log entry from the source storage system to the destination storage system prior to the synchronization phase, wherein said mirroring at least a portion of the modified data in the destination storage system comprises using data from at least some of the log entries in the destination storage system to mirror said portion of modified data in the destination storage system (column 4, lines 26-32; column 5, lines 1-10).

Regarding claims 9, 18 and 19, Yanai with Tremblay teaches a method of mirroring

data, the method comprising, in a first storage appliance:

receiving a plurality of requests to write data from a set of client devices, the

requests for causing modification of a plurality of blocks of data stored in a first set of non-

volatile storage devices coupled to the first storage appliance (See Yanai, Fig. 1, Primary

Data Storage System 14; column 7, lines 48-57);

storing modified data in the first set of non-volatile storage devices based on the

requests (See Yanai, column 7, lines 51-58);

initiating a process of synchronizing data in the first set of non-volatile storage

devices with data stored in a second set of non-volatile storage devices coupled to a

second storage appliance (See Yanai, Fig. 1, Primary Data Storage System 14; column

7, lines 48-57); including

sending each block of a first subset of the plurality of blocks from the first

storage appliance to the second storage appliance, to cause the second storage appliance

to store the blocks of the first subset in the second set of non-volatile storage devices (See

Yanai, column 38, lines 63-67; column 39, lines 1-19), and

for each block of a second subset of the plurality of blocks, sending a reference

from the first storage appliance to the second storage appliance, instead of sending the

corresponding block, each said reference for use by the second storage appliance to locate

the corresponding block in local storage of the second storage appliance and to store the

corresponding block in the second set of non-volatile storage devices (See Tremblay,

column 1, lines 59-67; Tremblay discloses the write requests received at the second

storage processed prior to commit-synchronization with first storage device which could

results in synchronization without transfer of modified data from the first storage).

2.   Claims 3-6, 12-15, 20, and 23 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Yanai et al. (US Patent 6,505,205 B1), hereinafter simply Yanai, and

Tremblay et al. (US Patent 6,728,898, B2), hereinafter simply Tremblay, in further in

view of Selkirk et al. (US Patent Application 2002/0178335 A1), hereinafter simply

Selkirk.

        Regarding claim 3, Yania and Tremblay teach a method of mirroring data stored

in a source storage system disk (See claims 1 and 2 rejections above).

        Tremblay fails to teach a transfer ID.

        Selkirk teaches a method, wherein the each reference comprises a transfer ID

indicating a data transfer in which the corresponding block was previously sent from the

source storage system to the destination storage system (page 5, paragraph 85; page

6, paragraph 86 and 87; Selkirk discloses the multiple layers of mapping table entry

which may provide unique identification of the storage location).

        At the time of invention it would have been obvious to a person of ordinary skill

in the art to combine the Tremblay with Selkirk. The motivation for doing so would have

been an efficient copy using virtual mapping scheme (page 13, paragraph 196).

Therefore, it would have been obvious to combine Tremblay with Selkirk for the benefit

of an efficient mirroring using Selkirk's virtual mapping scheme.

Regarding claim 4, Selkirk teaches a method, wherein each said reference

comprises an indication of a location at which the corresponding block was located within the

data transfer (page 1, paragraph 10).

Regarding claim 5, Selkirk teaches a method, wherein said mirroring at least a

portion of the modified data in the destination storage system comprises storing in the source

storage subsystem an association between the transfer IDs (page 5, paragraph 85; page 6,

paragraph 86 and 87; Selkirk discloses the multiple layers of mapping table entry which

may provide unique identification of the storage location) and blocks wholly modified by

the requests (page 6, paragraph 92).

Regarding claim 6, Selkirk teaches a method, wherein said mirroring at least a

portion of the modified data in the destination storage system comprises storing in the

destination storage subsystem an association between the transfer IDs (page 5,

paragraph 85; page 6, paragraph 86 and 87; Selkirk discloses the multiple layers of

mapping table entry which may provide unique identification of the storage location)

and a plurality of offsets, the offsets indicating locations in local storage of the destination

storage system at which corresponding blocks of data are stored (Fig. 9, Load Point and

Offset 906, page 6, paragraph 92).

Regarding claims 12, 20, and 23, Selkirk teaches a method, wherein said sending a reference from the first storage appliance to the second storage appliance comprises, for each block of the second subset of the plurality of blocks:

sending a transfer ID (page 5, paragraph 85; page 6, paragraph 86 and 87; Selkirk discloses the multiple layers of mapping table entry which may provide unique identification of the storage location) and a block number associated with the block to the second storage appliance, the transfer ID identifying a data transfer in which the block was sent to the second storage appliance during said transmitting the log entry (page 10, paragraph 158 and 161; page 13, paragraph 190), the block number indicating a location of the block within said data transfer (page 1, paragraph 10).

Regarding claim 13, Selkirk teaches a method of mirroring data, the method comprising, in a first storage server:

receiving a plurality of requests to write data from a set of client devices, the requests for causing modification of a plurality of blocks of data (Fig. 1, Clients 108, 110, and 112; page 2, paragraph 39);

creating a log entry for each of the requests; transmitting the log entry for each of the requests to a second storage server located at a secondary site, using one or more data transfers (page 13, paragraph 190), each of the data transfers including one or more of the modified blocks and having a unique transfer ID (page 5, paragraph 85; page 6,

paragraph 86 and 87; Selkirk discloses the multiple layers of mapping table entry which

may provide unique identification of the storage location);

saving modified data in a first set of non-volatile storage devices coupled to the first

storage server based on the requests (See Tremblay, Fig. 1, First Data Storage Device 105;

column 3, lines 42-62); and

initiating synchronization of data in the first set of non-volatile storage devices with

data stored in a second set of non-volatile storage devices coupled to the second storage

server (See Tremblay, column 1, lines 59-67), wherein said initiating synchronization

includes

for each of the plurality of blocks which has been only partially modified as a

result of the requests, sending the partially modified block to the second storage server (page

11, paragraph 168), and

for each of the plurality of blocks which has been wholly modified as a result of

the requests, sending a transfer ID (page 5, paragraph 85; page 6, paragraph 86 and 87;

Selkirk discloses the multiple layers of mapping table entry which may provide unique

identification of the storage location) and a block number associated with the wholly

modified block to the second storage server instead of the wholly modified block, the transfer

ID identifying a data transfer in which the wholly modified block was sent to the second

storage server during said transmitting the log entry (page 13, paragraph 190), the block

number indicating a location of the wholly modified block within said data transfer.

Regarding claim 14, Selkirk teaches a method, further comprising:

maintaining a transfer ID structure (page 5, paragraph 85; page 6, paragraph 86

and 87; Selkirk discloses the multiple layers of mapping table entry which may provide

unique identification of the storage location) including each said transfer ID;

maintaining a buffer descriptor for each of the blocks (page 6, paragraph 92);

in response to said transmitting the log entry (page 13, paragraph 190) for each of the

requests to a second storage server, storing in the buffer descriptor for each block wholly

modified as a result of the requests,

an index to a corresponding transfer ID stored in the transfer ID structure (page

5, paragraph 85; page 6, paragraph 86 and 87; Selkirk discloses the multiple layers of

mapping table entry which may provide unique identification of the storage location),

and

a block number to indicate a location of the corresponding wholly modified

block within a data transfer in which the corresponding wholly modified block was sent to the

second storage server (page 6, paragraph 92) during said transmitting the log entry (page 13,

paragraph 190).

Regarding claim 15, Selkirk teaches a method, further comprising, in the second

storage server:

receiving the corresponding log entry transmitted from the first storage server for each

of the plurality of requests (Fig. 1, Clients 108, 110, and 112; page 2, paragraph 39),

including receiving the data transfers;

storing each of the received log entries in local storage of the second storage

server, including storing the blocks contained in the data transfers (page 13, paragraph

190);

storing each of the transfer IDs (page 5, paragraph 85; page 6, paragraph 86 and

87; Selkirk discloses the multiple layers of mapping table entry which may provide

unique identification of the storage location) of the data transfers in association with a

corresponding offset, each offset indicating a location in the local storage of the second

storage server at which a block transferred in the corresponding data transfer is stored (Fig.

9, Load Point and Offset 906, page 6, paragraph 92);

during said synchronization of data, for each of the plurality of blocks which has

been modified as a result of the requests (See Tremblay, column 9, lines 18-23),

receiving from the first storage server either a modified block or a transfer ID

(page 5, paragraph 85; page 6, paragraph 86 and 87; Selkirk discloses the multiple

layers of mapping table entry which may provide unique identification of the storage

location) and block number of a modified block;

if a modified block has been received from the first storage server, then

storing the modified block in the second set of storage devices (See Tremblay, column 9,

lines 53-56); and

if a transfer ID and block number of a modified block have been received from

the first storage server, then

using the received transfer ID to identify the offset (Fig. 9, Load

Point and Offset 906, page 6, paragraph 92) associated therewith in the local storage

by; using the identified offset to retrieve the modified block from the local storage, and

storing the modified block retrieved from the local storage in the second set of storage

devices (See Tremblay, column 1, lines 59-67).

Response to Arguments

Applicant's arguments with respect to claims 1-16, and 18-23 have been

considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel B. Ko whose telephone number is 571-272-8194.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Reginald G. Bragdon can be reached on 571-272-4204. The fax phone number for the organization where this application or proceeding is assigned is 703-273-8300.
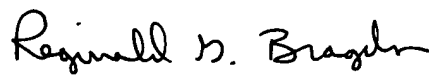
Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

REGINALD BRAGDON
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

Daniel B. Ko

AU 2189